WHAT IS CLAIMED IS:

1. A solid state laser gain medium having first and second ends along a laser optical axis in which at least one end is profiled to provide a level of thermal lensing at a predetermined operating power, in which the predetermined beam quality is centered substantially on a maximum at the predetermined operating pump power.

2. A solid state laser gain medium as defined in Claim 1, in which both ends of the solid state laser gain medium are profiled.

3. A solid state laser gain medium as defined in Claim 1, in which the solid state laser gain medium is formed of Nd:YAG

4. A laser oscillator cavity including a solid state laser gain medium as defined in Claim 1.

5. A laser oscillator cavity as defined in Claim 4, further comprising:

flat cavity end reflectors.

6. A laser oscillator cavity as defined in Claim 4, further comprising:

a Q-switch having first and second acousto-optic cells and respective first and second non-parallel polarization orientations.

7. A laser oscillator cavity as defined in Claim 4, further including a Q-switch comprising:

at least one acousto-optic cell having a reflective end forming a cavity end reflector.

8. A laser oscillator cavity as defined in Claim 4, further comprising:

a frequency converter; and

a frequency selective reflector between the solid state laser gain medium and the frequency converter.

9. A laser including a solid state laser gain medium as defined in Claim 1.

10. A laser as defined in Claim 9, further comprising:

a side-pumping diode element.

11. A Q-switch for a laser comprising:

first and second acousto-optic cells in respective first and second non-parallel polarization orientations.

12. A Q-switch as defined in Claim 11, further comprising:

a reflective surface arranged to form a laser cavity mirror.

13. A laser including a Q-switch as defined in Claim 11.

14. Cancelled.

15. An optical gain cavity including a gain medium and arranged to operate at a substantially maximum beam quality for a predetermined operating power.

16. A laser cavity comprising:

a laser cavity element;

a first end reflector;

an output end reflector; and

a gain medium provided between the first end reflector and the output end reflector, the cavity further comprising:

a laser cavity element frequency converter between the gain medium and the output end reflector; and

a frequency selective reflector between the gain medium and the frequency converter in which the laser cavity elements are aligned on a common physical axis.

17. Cancelled.

18. A laser cavity as defined in Claim 16, wherein the frequency selective reflector and the output end reflector are arranged to output laser light converted by the frequency converter to be used at a workpiece at the converted frequency.

19. A laser cavity as defined in Claim 16, in which the frequency converter is a second harmonic generator.

20. A laser cavity as defined in Claim 16, in which the output end reflector reflects the fundamental frequency generated by the gain medium.

21. A laser cavity as defined in Claim 16, in which the frequency converter has a large acceptance angle.

22. A laser including a laser cavity as defined in Claims 16.

23. A laser ablation device comprising a laser as claimed in claim 9, claim 13 or claim 22.

24. A method of profiling a laser gain medium end comprising:

providing a level of thermal lensing at a predetermined pump power such that a predetermined beam quality is achieved at the predetermined pump power.

25. A method of controlling pumping of a Q-switched pulsed laser comprising:

reducing pump power to a quiescent level between bursts of laser pulses.

26. A laser amplifier having:

a laser cavity; and

an amplifying module external to the laser cavity, said amplifying module sharing a common axis of emission with said laser cavity and comprising a gain medium having first and second ends along said axis of emission;

whereby at least one of said first or second ends is profiled so as to directly couple light from said laser cavity into said amplifying module.

27. A laser amplifier as defined in Claim 26, wherein one or both of said first or second ends are profiled to form a lens having a predetermined focal length.

28. A laser amplifier as defined in Claim 26, wherein said laser comprises a gain medium with profiled ends.

29. A laser amplifier as defined in Claim 27, in which the lens is one of a refractive lens, a diffractive lens, or a GRIN lens.

30. A laser amplifier as defined in Claim 27, wherein said laser gain medium ends are profiled to form a lens having a predetermined focal length.

31. A laser amplifier as defined in Claim 30, wherein said lens of said laser gain medium and said lens of amplifier gain medium have substantially equal focal lengths.

32. A laser amplifier as defined in Claim 30, whereby said laser gain medium lens and said amplifier gain medium lens are concavely profiled.

33. A laser amplifier as defined in Claim 26, wherein said laser and said amplifying medium are pumped simultaneously.

34. A laser amplifier as defined in Claim 33, wherein said laser pump and said amplifying pump have equal power.

35. A laser amplifier as defined in Claim 26, in which an input surface to the amplifier is tilted.

36. An optical amplifier module comprising:

a medium having first and second ends, at least one end being profiled to provide a level of lensing at a predetermined operating power, arranged such that, in use, the amplifier can be directly coupled to a laser of predetermined parameters.

37. A module as defined in Claim 33, in which, for an amplifier medium comprising a rod of diameter D_R, length L_R refractive index n_L, refractive index of air n_{air}, and thermal focal length f_{th} arranged to receive an input beam from a laser having waist distance d_0 from the input rod end, the rod is profiled with a radius of curvature R given approximately by

$$R = \frac{d_0(4f_{th} - L_R)(n_L - n_{air})}{n_L(4f_{th} - L_R - 2d_0)}.$$

38. A method of making a laser amplifier module gain medium comprising:

profiling at least one end thereof to provide a level of lensing at a predetermined operating power, arranged such that, in use, the amplifier can be directly coupled to a laser of predetermined parameters.

39. A method of designing a laser amplifier as comprising identifying a profile as defined in Claim 34.

40. Cancelled.

41. A method of controlling pumping in a Q-switched, pulsed laser comprising:

reducing pump power below the laser cavity lasing threshold prior to full-power pumping.

42. A method of converting laser frequency in a laser cavity comprising:

cooling a frequency converter in the laser cavity to below an optimum frequency conversion temperature while the laser is in a non-lasing state.

43. A laser assembly comprising a gain medium as defined in Claim 1 and an amplifier as defined in Claim 26 coupled therewith.